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LIBERTY

PROPERTY TRUST

August 14, 2000

VIA TELEFAX AND FEDERAL EXPRESS

Joseph McDowell
Remedial Project Manager
U.S. Environmental Protection Agency
1650 Arch Street - 3HS21
Philadelphia, PA 19103

Re: Comments on the Proposed Remedial Action Plan For the Crater Resources Superfund Site

Dear Mr. McDowell:

The purpose of this letter is to submit comments on the Proposed Remedial Action Plan ("PRAP") for the Crater Resources Superfund Site ("Site") on behalf of Liberty Property Trust ("Liberty"). Liberty has invested more than $25 million in land and buildings on a portion of the Site and an additional $100 million in Renaissance Park, a business park that is adjacent to the Site. As such, Liberty has a significant interest in the remedial actions to be undertaken at the Site. Since its purchase of these properties, Liberty has been working voluntarily, in coordination with EPA, to identify and address any issues of environmental concern present on its properties. Liberty's work has included site investigation and characterization, well installation, soil and groundwater sampling and investigation, removal of historic pipeline and impacted soils, preparation of reports on completed work, and other remedial efforts. As a result, Liberty has completed much of the work on its properties that might otherwise need to be addressed by the Record of Decision ("ROD").

Liberty submits the following comments on the PRAP to direct EPA's attention to the significant work already completed by Liberty in coordination with EPA and to request that EPA acknowledge in its ROD that Liberty's work completed to date, as well as its future development plans as submitted to EPA, fully and appropriately addresses all environmental issues of concern on Liberty's property. In addition, the following comments identify particular concerns of Liberty regarding the proposed remediation of neighboring properties. Liberty requests that EPA address these concerns to ensure that these neighboring properties are fully and appropriately remediated and do not present a threat to the surrounding community or our significant investment in Renaissance Park.

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Liberty's Comments on the PRAP

Comment 1.

EPA has proposed further evaluation of the former Waste Ammonia Liquor ("WAL") pipeline with the selection of Alternative SW-3, WAL Pipeline Investigation. A portion of the WAL pipeline was formerly located on property now owned by Liberty, in particular, on Liberty's "Yellow Parcel" and "Pink Parcel". Liberty has already investigated and removed those portions of the WAL pipeline and impacted soils that were located on the Yellow Parcel and the Pink Parcel. As such, no further investigation of these areas is necessary and these properties should be excluded from further investigation required under the Record of Decision ("ROD").

Liberty undertook an extensive investigation of the former WAL pipeline and associated soils present on the Yellow Parcel in connection with its purchase of that property. The results of the initial pipeline investigation and a workplan for pipeline removal and site characterization activities were provided to EPA in a document entitled Work Plan to Complete Additional Site Characterization Activities and to Remove a Buried Pipeline at the Yellow Parcel, prepared by Liberty's consultant, Penn Environmental & Remediation, Inc. ("Penn E&R"), and dated June 25, 1998. EPA verbally approved the workplan on October 13, 1998. A total of thirty surficial and subsurface soil samples were collected along the former pipeline. The sample results indicated that several distinct areas along the pipeline had been impacted, likely as a result of historical releases from the pipeline.

In late 1999 and early 2000, Penn E&R completed the removal of pipeline and impacted soil from the Yellow Parcel. All sections of the former pipeline located on the Yellow Parcel (a total of 1,575 feet of pipe) and approximately 200 cubic yards of impacted soil were removed, as documented in the Remedial Action Completion Report prepared by Penn E&R, dated May 5, 2000. The excavated soil is currently staged on the Yellow Parcel and is awaiting shipment to an off-site disposal facility. Fifteen post-excavation soil samples were collected to confirm the effectiveness of soil and pipeline removal activities. Liberty provided the Remedial Action Completion Report to EPA on May 5, 2000.

Because Liberty has already fully and completely investigated and removed, at its own expense, the portions of the former WAL pipeline and impacted soils on the Yellow Parcel, we believe that no further investigation or remediation is necessary on that property. Also, as demonstrated in the Remedial Action Completion Report, the results of the post-excavation sampling show that there is not a significant risk on the Yellow Parcel to industrial workers, construction workers or adolescent trespassers. We, therefore, request that EPA, specifically exclude in the ROD, any further investigation of the portions of the pipeline formerly located on the Yellow Parcel.

Additionally, Liberty conducted a similar pipeline investigation and removal, including sampling, on another of its properties, known as the Pink Parcel, located on the north side of Renaissance Boulevard at the intersection with Horizon Drive. A report documenting the pipeline removal and sampling results was submitted to EPA on March 2, 1998. Based upon the completion of pipeline investigation and removal at the Pink Parcel, we are also requesting that the ROD specifically exclude any further investigation of the portion of the former pipeline on the Pink Parcel.

Comment 2.

EPA has proposed the selection of Alternative S-5, Quarry 3 Removal/Low Permeability Capping which, despite its name, includes not only the capping of Quarry 3 (after removal of the liquids and contaminated sediments and soils in the quarry) but the capping of Quarries 1, 2 and 4 and all other remaining affected areas with a multi-media cap. EPA has proposed the installation of a multi-media cap in order to "prevent direct contact with contamination and unacceptable leaching of contaminants into groundwater beneath the Site". In addition, Remedial Alternative S-5 also requires the placement of institutional controls (use restrictions, title notices and proprietary controls) to ensure cap integrity and long term maintenance and a five-year review of the capped areas to ensure the effectiveness of the remedy. The PRAP states that the 5-year review is necessary because "contaminated media will be left on-site". The alternative also provides that "construction or use of the property that in any way is inconsistent with the proposed remedy and the integrity of the cap would be prohibited."

Liberty believes that the Quarry 4 area located on Liberty's Yellow Parcel does not warrant a multi-media cap and that improvements to this area already made by Liberty, and those for which Liberty has already obtained development approval from Upper Merion Township, serve as a sufficient and appropriate remedy for the conditions related to Quarry 4. As such, Liberty requests that EPA's ROD acknowledge that these improvements constitute an appropriate remedy for the conditions related to Quarry 4 and that no additional actions are necessary.

The PRAP notes that the draft Feasibility Study ("FS") Report called for the installation of a multi-media cap over Quarry 3 and the placement of asphalt capping on the remaining areas or those areas where development of the office park is anticipated. However, the PRAP goes on to state that "due to the uncertainty of future actions at the Site, EPA has chosen multi-media capping for all affected areas". We do not believe that this justification serves as a sufficient basis for requiring a multi-media cap over Quarry 4 on the Yellow Parcel where the future development on this tract is known and certain, as set forth below. Further, we believe that Liberty's existing and planned improvements to the Yellow Parcel appropriately address all conditions of concern related to that portion of Quarry 4 on Liberty's Yellow Parcel.

Liberty has been developing the Yellow Parcel, in coordination with EPA, as a further extension of the Renaissance office park and its complete plans include the construction of two

office buildings referred to as 2201 and 2301 Renaissance Boulevard. As part of its development of 2201 Renaissance Boulevard, Liberty has already developed and significantly altered the ground surface of the portion of Quarry 4 located on the Yellow Parcel. Liberty's grading work on that property has added 20 to 25 feet of soils to the surface of Quarry 4, which had already been filled to grade during previous ownership. These soils were added in order to reduce the slope in the area of the quarry and were placed over the quarry in 6-inch lifts and then rolled and compacted. The soils used in this effort were relocated from the northern portion of the Yellow Parcel. Based upon studies completed by SCE & Associates, Inc., these soils are known to have a clay content of 10-30%, making them very effective at impeding the infiltration of stormwater.

Further, Liberty has constructed over the portion of Quarry 4 located on the Yellow Parcel, a portion of the 2201 building, an asphalt parking lot and a lined stormwater detention basin. These improvements have completely eliminated direct contact with the materials in Quarry 4 on the Yellow Parcel and have significantly reduced the amount of stormwater infiltration through fill materials in the portion of Quarry 4 on the Yellow Parcel. As such, the improvements achieve the goals of capping and control that EPA has identified in the PRAP. In addition, the construction plans for these 2201 site improvements were presented to EPA at a meeting on June 25, 1999. Plans for the improvements at 2301 Renaissance Boulevard were provided to EPA on January 27, 2000. Having been provided with Liberty's plans, EPA has never asserted any objections to Liberty's proposed development plans for the Yellow Parcel. Liberty's improvements to the Yellow Parcel, which have been shared with EPA, satisfy the goals of, and are consistent with, the capping remedy proposed by EPA.

Furthermore, there is no evidence that any of the constituents present in Quarry 4 have impacted groundwater at the Site, to date, or that there is a future threat that surface waters (stormwater) would cause unacceptable leaching of these constituents into the groundwater. The chemical constituents present within Quarry 4 are significantly different from those present in Quarries 1, 2 and 3 and other impacted areas of the Site. Despite investigation, no evidence has been found of any direct disposal of WAL or other Site related organic materials into Quarry 4. In fact, based upon sampling conducted in and around Quarry 4, there is no reason to believe that the quarry ever received Site related contaminants via even an accidental or overflow scenario from the WAL pipeline or the other quarries. The constituents of concern that have been identified within Quarry 4 consist primarily of metals. These metals are considered to be associated with the fill material in Quarry 4, which was presumably added to bring the quarry up to surface grade. In a memo dated February 18, 2000, Penn E&R analyzed the effect on groundwater of the inorganic constituents found in the fill materials of Quarry 4. The memo was provided to EPA and has been attached hereto for ease of reference. As demonstrated in the memo, soil and groundwater sampling results in the vicinity of Quarry 4 do not indicate an impact of the quarry fill materials on groundwater quality.

Accordingly, there is no evidence to suggest that Quarry 4 or the fill material contained therein has impacted groundwater quality at the Site. Nevertheless, Liberty's development of the 2201 property and the planned development of the 2301 property, which has received final land

development approval from Upper Merion Township, will further significantly eliminate any potential for the infiltration of stormwater into the former Quarry 4. In addition, it will reduce any potential for direct contact to soils in the quarry. Therefore, Liberty requests that the ROD specifically acknowledge these facts and determine that Liberty's existing improvements to the 2201 property (building, parking lot, lined stormwater basin, and soil cover) and similar improvements planned for the 2301 property (i.e., soil cover and installation of a lined stormwater basin) are an appropriate remedy for the conditions related to Quarry 4 on the Yellow Parcel.

Note also, that Liberty has serious concerns about the nature of any institutional controls that might be applicable to its Yellow Parcel under the ROD. For the reasons set forth above, Liberty believes that its past and future work at the Yellow Parcel will be sufficient to fully and appropriately address all issues of environmental concern there without the need for institutional controls. If EPA, nevertheless, intends to include in the ROD any future remedial requirements, other than those already being implemented by Liberty, including any institutional controls, then Liberty requests the opportunity to meet with EPA to discuss those requirements. It would be wholly unfair to Liberty if, after years of coordination with EPA on its Yellow Parcel investigation and development, EPA were to impose on Liberty new or inconsistent remedial requirements for the Yellow Parcel without even meeting with Liberty to discuss how those requirements fit within the scope of work that Liberty has already completed or is in the process of completing.

Comment 3.

The chosen method for the remediation of Quarry 3 (i.e., liquid, sediment, and soil removal and capping) is an active method of remediation, which is commended by Liberty. However, as an adjacent landowner and property owner with significant holdings in the area of the Site, Liberty is concerned about the potential effect of the remedial activities on its tenants and on its development activities on adjacent properties. Many questions appear to remain unanswered. For instance, has EPA determined where access will be obtained for the numerous construction vehicles and vehicles that will be needed to transport liquid and solid wastes off-site? Will the dewatering of the ponds and the exposure and excavation of the sediments cause any significant air emission issues for nearby residents, tenants or construction workers working on Liberty's Yellow Parcel? Liberty notes that remedial efforts conducted at Area 6 produced noticeable odors in the area of the 2201 Renaissance Boulevard construction site. What contingencies are provided in the event that remediation activities require the evacuation of or prohibit the occupation of nearby properties? Liberty requests that the ROD specifically address these concerns for the safety of the surrounding populations.

In addition to the health aspect of the Quarry 3 remediation, Liberty is concerned about the manner of implementation of the remedial action and its perception by the tenants in Renaissance Park. Renaissance Park is a professional office park where tenants, clients and their guests conduct business and expect a professional atmosphere to be maintained. As such, we

request that EPA make clear in the ROD that persons performing the remedial action must respect the professional atmosphere and avoid inconvenience to and disturbance of the office workers and businesses operating in Renaissance Park to the greatest extent possible and that the remedial action must be conducted with the utmost discretion. Our tenants and their clients and guests have the right to continue to do business in a professional environment and that environment need not and, therefore, must not be threatened in any way. In addition, Liberty requests that EPA and the remediators keep Liberty apprised of the nature of ongoing remedial actions as communication will be critical in allowing Liberty to head off any rumors or any other false information that may start to circulate concerning actions at the Site. With the economy as strong as it is in the Philadelphia area, employee retention is a critical concern of our tenants and any real or perceived threats to welfare and safety will make retention difficult, if not impossible. Liberty requests that the ROD specifically address how the remediation will be organized to minimize disruption of the businesses located in Renaissance Park.

Comment 4.

EPA states in the PRAP that "past reports have indicated the presence of a strong phenolic odor and a lens of tarry material in the subsurface" at Area 6 and that a soil sample from the area revealed the presence of constituents in the soil similar to WAL. The PRAP then states that "all soil and materials in Area 6, determined to be geotechnically unstable through an investigation conducted by the current property owner, were recently removed by a private contractor so the property could be marketed for development." It is unclear from this statement whether the noted contamination at Area 6 has been completely addressed to EPA's satisfaction.

Area 6 is located near the building constructed by Liberty at 2201 Renaissance Boulevard and, as such, Liberty is concerned that there may be unresolved contamination issues in this neighboring area. Liberty would like to know what contaminants have been identified at this location and if and how are they going to be addressed by the ROD. Further, Liberty would like to know if EPA is satisfied with investigation and remediation activities that have occurred at Area 6 to date. For example, have sampling, remediation and risk assessment efforts been conducted at Area 6 in accordance with EPA protocols? Was a CLP lab used for the analysis of any samples collected by the property owner? Area 6 represents an area of known contamination that does not seem to have been sampled by the PRP Group and for which no evaluation of remedial alternatives has been provided. Why hasn't this area of the Crater Resources Site been subjected to the rigorous CERCLA RI/FS process? Given the noted presence of contamination in Area 6, the ROD should specifically address the issues identified above. Further it should either conclude that Area 6 has been remediated to its satisfaction or identify the remedial activities that will be necessary to ensure that Area 6 does not present a threat to human health or the environment.

Comment 5.

At recent a public meeting, a local resident raised concerns about the continued presence of tarry materials on the surface of the Site. The material is believed to be WAL-related wastes from the pipeline that carried and discharged WAL to Quarries 1, 2, and 3. It appeared at the public meeting that the presence of these materials was not previously known to EPA or the PRP Group. It also was revealed during one of the public meetings that the stormwater basin for a proposed development between Quarries 1 and 2 was to be located where there is a heavy concentration of surficial tar material, a material which is presumably the hardened form of the WAL. To the extent that these pipeline wastes have been found unexpectedly at the Site, it appears that additional investigation of the pipeline route between Quarries 1, 2, and 3, in particular, is necessary. As acknowledged in the PRAP, Liberty has removed all sections of the pipeline and associated contaminated soils on its properties. Liberty is concerned, however, that surficial or close-to-surface contamination may still be present on neighboring properties and that it may pose a threat to surrounding populations. EPA should specifically require, in the ROD, specific identification of the location of tarry materials and remediation of such materials in and around the former pipeline route from the eastern property line to Quarries 1, 2 and 3.

* * *

Liberty has consistently expressed a willingness to perform responsibly with respect to the remediation of its properties near the Crater Resources Superfund Site. Our work has been thorough and our communication with the EPA and other agencies has always been open. We hope that you will acknowledge the concerns we have set forth in this letter and will allow us to meet with you to discuss these concerns before you issue the final ROD. If you require any additional information concerning these issues, please let me know. Me direct line is 610.648.1761.

Sincerely,

Bruce Hartlein
Vice President
LIBERTY PROPERTY TRUST

BH/gb
Enclosure

request that EPA make clear in the ROD that persons performing the remedial action must respect the professional atmosphere and avoid inconvenience to and disturbance of the office workers and businesses operating in Renaissance Park to the greatest extent possible and that the remedial action must be conducted with the utmost discretion. Our tenants and their clients and guests have the right to continue to do business in a professional environment and that environment need not and, therefore, must not be threatened in any way. In addition, Liberty requests that EPA and the remediators keep Liberty apprised of the nature of ongoing remedial actions as communication will be critical in allowing Liberty to head off any rumors or any other false information that may start to circulate concerning actions at the Site. With the economy as strong as it is in the Philadelphia area, employee retention is a critical concern of our tenants and any real or perceived threats to welfare and safety will make retention difficult, if not impossible. Liberty requests that the ROD specifically address how the remediation will be organized to minimize disruption of the businesses located in Renaissance Park.

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Penn E&R
Environmental & Remediation, Inc

Memo

To: Brenda Hustis Gotanda, Esquire

cc: Erik Stephens

From: Mike Christie

Date: February 18, 2000

Re: Liberty Property Trust - Metals in Ground Water and Quarry No. 4

As you requested, this memorandum is intended to respond to allegations of the Crater Resources PRP Group (the "PRP Group") that there is a connection between the soil/fill material in the portion of Quarry No. 4 on Liberty's Yellow Property and elevated metals (total) detected in the ground water. In developing this memorandum, Penn E&R reviewed available soil, sediment and ground water data generated for Quarry Nos. 1 through 4, a majority of which are summarized in the Remedial Investigation (RI) and Feasibility Study (FS) Reports for the Crater Resources Superfund Site (the "Site") prepared by ERM for the PRP Group. Penn E&R also reviewed the USEPA's recently completed Risk Assessment report.

Based on our review of the aforementioned documents, Penn E&R does not believe that there is a connection between the soil/fill in Quarry No. 4 and the elevated metals detected in ground water at the Site. In fact, as presented below, there are several factors not associated with Quarry No. 4 that are more likely affecting metal concentrations in the ground water downgradient of Quarry No. 4. Penn E&R believes that the primary potential sources for the elevated metals present in the ground water are Quarry Nos. 2 and 3. The implementation of additional site investigations, such as the completion of additional rounds of ground water sampling and the installation of at least one monitoring well directly downgradient of Quarry No. 3, would be required to confirm this conclusion.

1. Sampling Results Suggest a Connection Between Well MW-17D and Quarry No. 3

Certain contaminants detected in well MW-17D were found at elevated levels in samples obtained from Quarry No. 3 which suggests that the contaminants in this well may have migrated from Quarry No. 3. The ground water sample collected from well MW-17D displayed total cyanide at a level of 74 micrograms per liter (ug/l). Cyanide was not detected above its USEPA soil-to-ground water Soil Screening Level (SSL) of 150 mg/kg (DAF-20) in any of the twenty-two soil samples obtained from Quarry No. 4. These sample results suggest that the soils in Quarry No. 4 are not the source for the cyanide detected in well MW-17D. However, cyanide was detected above its USEPA SSL of 150 mg/kg in a number of soil and sediment samples collected from Quarry No. 3. These results indicate that: 1) Quarry No. 3 is the likely source of the cyanide detected in well MW-17D; 2) there may be a direct hydraulic connection between Quarry No. 3 and well MW-17D; and 3) the contaminant plume emanating from Quarry No. 3 extends out past well MW-17D. If Quarry No. 3 is the source for the elevated cyanide concentration detected in well MW-17D, which it clearly appears to be, Quarry No. 3 could also be the

source for the other contaminants, such as the metals, detected at elevated levels in the ground water downgradient of Quarry No. 4.

ERM indicates that vanadium was one of the metals most commonly detected at elevated levels in the ground water. EPA stated, in its comments on ERM's FS report, that "vanadium anions may be very soluble in oxidizing alkaline environments. ERM's suggestion that vanadium in the ground water may not be Site related is likely false given the alkaline nature of the Waste Ammonia Liquor (WAL) and the association of vanadium with coal production." This statement suggests that EPA believes vanadium is a concern in ground water because it has been mobilized by the presence of WAL in the environment. Unlike Quarry Nos. 1 through 3, WAL has never been shown to have been discharged into Quarry No. 4.

As discussed in the RI report, ERM believes that ground water beneath the Site flows to the east. Based on this flow direction, Quarry No. 3 is upgradient of Quarry No. 4. However, there are no wells located between the two quarries or located directly downgradient of the eastern end of Quarry No. 3. As such, there is insufficient information available to evaluate an independent effect, if any, of Quarry No. 4 on downgradient well MW-17D.

2. Soil Sample Results suggest that Quarry No. 4 is not the Source of Metals Detected in the Ground Water

The USEPA's risk assessment identified the following metals as the major contributors to the unacceptable risks calculated for the ground water at the Site: aluminum, arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, thallium, and vanadium. With the exception of arsenic, manganese, and thallium, these metals were not detected above their respective USEPA soil-to-ground water SSLs (DAF-20) in any of the twenty-two soil samples collected from Quarry No. 4. Therefore, based upon comparison of Quarry 4 soil data to the SSLs, there is no potential for aluminum, barium, beryllium, cadmium, chromium, copper, iron, nickel, selenium or vanadium to have leached to ground water from Quarry No. 4 soils.

Although the average concentration of arsenic in the soils in Quarry No. 4 of 9.5 mg/kg exceeds the USEPA's soil-to-ground SSL of 0.026 mg/kg (DAF-20), arsenic was not detected above its USEPA MCL of 50 ug/l in any of the wells located downgradient of Quarry No. 4 (i.e., wells MW-16, MW-17, and MW-18). This suggests that soils in Quarry No. 4 are not having an adverse impact on ground water quality. Wells MW-11S and MW-12, which are located adjacent to and downgradient of Quarry No. 3, each displayed arsenic above the USEPA's MCL of 50 ug/l. These sample results suggest that, unlike the soils in Quarry No.4, the soils in Quarry No. 3 are the source, or are contributing to, the elevated arsenic levels detected in the ground water.

Manganese was detected above its USEPA soil-to-groundwater SSL of 950 mg/kg in several soil samples obtained from Quarry No. 4 as well as in at least one sample collected from each of Quarry Nos. 1, 2, and 3. Manganese was detected above its USEPA secondary drinking water standard of 50 ug/l in the wells located downgradient of Quarry No. 4 and in the wells located downgradient of Quarry Nos. 2 and 3. The highest manganese concentration (33,600 ug/l) was detected in well MW-13D, which is located adjacent to and downgradient of Quarry No. 2 but well upgradient of Quarry No. 4. These results suggest that Quarry No. 2 is the likely primary source for the elevated manganese levels detected in the ground water.

The average thallium concentration for the twenty-two soil samples collected from Quarry No. 4 was below the USEPA's soil-to-groundwater SSL of 3.6 mg/kg (DAF-20). Based on these results, the soils in Quarry No. 4 are not expected to be a contributing source for the elevated thallium levels present in the ground water. It should be noted that only five of the twenty-two soil samples collected from Quarry No. 4 exhibited individual thallium levels that exceeded the USEPA SSL of 3.6 mg/kg (DAF-20). It is difficult to compare these results to sample results obtained from Quarry Nos. 1 through 3 as the results for the samples in which thallium was detected (soil and water), except sample Q2-5, were listed as qualitatively

invalid. Sample Q2-5 was collected from Quarry No. 2 on January 12, 1999. This sample exhibited a thallium level of 8.3 mg/kg, which is higher than the thallium level for any of the samples collected from Quarry No. 4. Even though it was flagged as qualitatively invalid, the highest thallium level present in the ground water was detected in the sample collected from well MW-13D, which is located adjacent to and downgradient of Quarry No. 2 but well upgradient of Quarry No. 4. These results suggest that Quarry No. 2 could be the primary source or, at a minimum, could be contributing to the thallium levels detected in the ground water.

3. Quarry No. 3 may be a Source of Lead

The USEPA has not developed a soil-to-groundwater SSL for lead. Therefore, it is difficult to evaluate whether or not the soils in Quarry No. 4 could be a source for the elevated lead levels detected in the ground water. However, it should be noted that a liquid sample obtained from saturated sediments in Quarry No. 3 displayed a lead level of over 200 ug/l, which is well above the USEPA's recommended drinking water action level of 15 ug/l. The presence of lead at elevated levels in this sample and the apparent connection between Quarry No. 3 and well MW-17D, suggest that Quarry No. 3 could be the source of the elevated lead levels detected in the ground water.

4. Vertical Migration of Metals in the Soils in Quarry No. 4 is not Occurring

A review of the sample results for shallow and deep soil samples collected from the same borings installed in Quarry No. 4 by Penn E&R reveals that, with the exception of aluminum and beryllium, the average concentration for the metals identified by the USEPA as the major contributors to the unacceptable risks calculated for the ground water decrease with depth. These results suggest that these metals are not being mobilized by conditions in Quarry No. 4 as they are not being leached from the shallow to the deep soils in the quarry. Although the aluminum and beryllium levels increase slightly with depth, as indicated earlier, neither aluminum nor beryllium was detected above its USEPA soil-to-groundwater SSL in any of the twenty two soil samples collected from Quarry No. 4 which suggest that there is no potential for these metals to leach into the ground water from Quarry No. 4 soils.

5. TCLP Results Indicate That Metals in the soils in Quarry No. 4 will not leach into the Ground Water

A soil sample collected from Quarry No. 4 by Penn E&R was analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) test method. The TCLP extract was subsequently analyzed for the metals silver, arsenic, barium, cadmium, chromium, copper, mercury, nickel, lead, selenium, and zinc. The results of the analysis of the extract revealed that none of the metals were detected in the leachate above their USEPA Maximum Contaminant Level (MCL)/Secondary Drinking Water Standard/Drinking Water Action level. These results suggest that, even under the very acidic conditions of the TCLP test method, the metals present in the soils in Quarry No. 4 would not leach into the ground water above applicable USEPA drinking water standards.

6. Impact of Area 6 on Metals Concentrations

Based on information included in ERM's FS report and visual observations made by Penn E&R, potentially impacted soil is being excavated from Area 6 which is located about 200 feet northeast of Quarry No. 4. According to information included in the FS report, the soil in this area was reported to have a slight phenolic odor. Penn E&R did not review any information indicating whether or not Area 6 was investigated to determine if it is the source, or if it could be contributing to the metal concentrations detected in the ground water. However, in light of the close proximity of Area 6 to wells MW-17S and 17D it is possible that this area is a source of these metals.

7. One Round of Sampling is Insufficient to Evaluate Contaminant Trends in the Ground Water

Based on information available to us, it appears that only one round of ground water sampling has been completed at the Site. Penn E&R does not believe that one round of sampling is sufficient to properly evaluate contaminant sources, migration pathways, and trends. This is especially true given the fact that the Crater Resources Superfund Site is underlain by a limestone aquifer. Limestone aquifers present one of the most complex hydrogeologic settings in which to predict ground water/contaminant flow and movement. This is due primarily to the karst nature and preferential flow paths (i.e., solution channels) associated with limestone aquifers. One set of ground water quality data does not allow the evaluation of how these aquifer features and/or possible seasonal variations in water levels may affect ground water quality conditions.

8. Sampling Techniques Improperly Biased Metals Results

The appearance of elevated metals in ground water likely does not reflect the true concentrations of metals in ground water but rather reflects the leaching of metals suspended in a turbid sample into the water by the addition of acid designed to preserve the sample. As such, the recorded levels of total metals in ground water is likely biased high and is not accurately depicting actual Site conditions.

As discussed in Section 3.0 of the RI Report and Section 1.0 of the FS Report, the water samples collected from some of the Site wells, including well MW-17D which generally displayed the highest metal levels, were very turbid and, thus, had a high concentration of suspended soil. Also, there is a significant difference between the "total" metal and "dissolved" metal results for wells MW-16 through MW-18. The "total" metal results are generally much higher than the "dissolved" metal results. ERM suggested that the turbid samples are likely the cause of the appearance of elevated metals in the ground water. As discussed below, Penn E&R concurs with ERM's conclusion.

Penn E&R suspects that the "total" metal results may have been biased high due to a combination of the turbid water samples and the sampling and preservation procedures used to collect the samples. The samples analyzed for "total" metals were not filtered prior to being preserved with acid. As a result, metals that are naturally occurring in the material suspended in the samples could be leached into the ground water by the addition of the preservation acid, thereby biasing the sample results and making it appear that the ground water contains those metals. In contrast, the samples analyzed for "dissolved" metals are filtered prior to being preserved with acid. As such, a majority of the suspended material, which would be present in a turbid ground water sample, has been removed prior to being preserved with acid and prior to being analyzed for dissolved metals.

A good example of how a turbid sample can be affected by sample collection and preservation techniques is comparison of the "total" and "dissolved" metals results for the ground water sample collected from well MW-17D on January 8, 1998 (see pages 18 through 19 of 20 in Table 13 in the RI report). The "total" results for this sample indicate that seven metals are present in the ground water at levels which exceed their MCL. However, no metals were detected above USEPA MCL's when the same sample was analyzed for "dissolved" metals. This very significant difference is most likely associated with the turbidity of the sample and the subsequent methods that were used to preserve the sample prior to analysis. This is not an uncommon problem and Penn E&R has encountered this same problem at other sites. At sites where turbidity in the wells is a problem, Penn E&R will normally use a low flow purging technique to purge the wells prior to sampling. The low flow purging technique limits, as much as possible, the stress on the surrounding aquifer, thereby reducing the turbidity of the water remaining/entering the well. When the turbidity of the water is reduced, less suspended material is likely to be present in the sample which in turn reduces the possibility that naturally occurring metals will be leached into the ground water when the preservation acid is added to the sample.